

CLAIMS

1. A multistage stroke cylinder apparatus comprising: a main cylinder including a main piston housed for sliding in a cylinder tube and driven by fluid pressure supplied to pressure chambers on opposite sides of said main piston and a main rod connected to said main piston, a head cover and a rod cover being mounted to opposite ends of said cylinder tube; an intermediate stop position setting mechanism for setting an intermediate stop position of said main piston; and a return position setting mechanism for setting a return position of said main piston,

wherein said intermediate stop position setting mechanism includes a stop position setting piston disposed for sliding between said main piston in said cylinder tube and said head cover to define said intermediate stop position of said main piston by coming in contact with said main piston, an auxiliary rod connected to said stop position setting piston and having a tip end passing through said head cover and extending outside, a stopper fitted with said tip end of said auxiliary rod to stop said stop position setting piston in a necessary position by coming in contact with a contact portion of said head cover, and a changing mechanism for changing a stop

position of said stop position setting piston by said  
stopper and

5                   said return position setting mechanism includes a  
return position setting piston provided for sliding to  
said head cover and a position setting rod connected to  
said return position setting piston and having a tip end  
projecting behind said stop position setting piston.

10                 2. A cylinder apparatus according to claim 1,  
wherein said changing mechanism has at least one of a  
mechanism for changing a mounting position of said stopper  
on said auxiliary rod and a mechanism for changing a  
position of said contact portion by a contact position  
adjusting piston.

15                 3. A cylinder apparatus according to claim 2,  
wherein said mechanism for changing said mounting position  
of said stopper has a plurality of stepped portions formed  
on opposite sides of an inner hole of said stopper and  
20                 having different depths and a stepped portion formed on an  
outer periphery of said auxiliary rod and is formed to be  
able to change said mounting position of said stopper on  
said auxiliary rod by changing an orientation of said  
stopper to selectively bring any of said stepped portions  
25                 into contact with said stepped portion of said auxiliary

rod.

4. A cylinder apparatus according to claim 2,  
wherein said mechanism for changing said position of said  
5 contact portion has said contact position adjusting piston  
having said contact portion and said adjusting piston is  
mounted to said head cover and driven by fluid pressure in  
such directions as to approach and move away from said  
stopper.

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5. A cylinder apparatus according to claim 1,  
wherein said auxiliary rod passes for sliding through said  
return position setting piston and said position setting  
rod and projects outside said head cover and has a flow  
15 path connecting a port for supplying pressure fluid and  
said pressure chamber on one side of said main piston in  
said auxiliary rod.

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6. A cylinder apparatus according to claim 1,  
20 wherein said main cylinder has a cushioning mechanism for  
reducing a speed of said main piston by restricting a  
discharge flow rate of fluid discharged from a discharge-  
side pressure chamber at an end of a stroke of said main  
piston.

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7. A cylinder apparatus according to claim 1,  
wherein said main cylinder has a stroke detector for  
outputting an electric signal according to a stroke  
position of said main rod and said stroke detector is  
5 connected to a detection controller for detecting an  
operating form of said main rod based on said output.

8. A cylinder apparatus according to claim 1,  
further comprising a balance mechanism for causing said  
10 stop position setting piston to stop in a position where  
said stop position setting piston has moved toward said  
main piston when pressure fluid at the same pressure is  
supplied to pressure chambers on opposite sides of said  
stop position setting piston.

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9. A multistage stroke cylinder apparatus  
comprising: a main cylinder including a main piston housed  
for sliding in a cylinder tube and driven by fluid  
pressure supplied to pressure chambers on opposite sides  
20 of said main piston and a main rod connected to said main  
piston, a head cover and a rod cover being mounted to  
opposite ends of said cylinder tube; an intermediate stop  
position setting mechanism for setting an intermediate  
stop position of said main piston; and a return position  
25 setting mechanism for setting a return position of said

main piston,

wherein said intermediate stop position setting mechanism includes a stop position setting piston disposed for sliding between said main piston in said cylinder tube and said head cover to define said intermediate stop position of said main piston by coming in contact with said main piston, an auxiliary rod connected to said stop position setting piston and having a tip end passing through said head cover and extending outside, a stopper fitted with said tip end of said auxiliary rod to stop said stop position setting piston in a necessary position by coming in contact with a contact portion on a side of said head cover, and a changing mechanism for changing a stop position of said stop position setting piston by said stopper,

20 said changing mechanism has at least one of a mechanism for changing a mounting position of said stopper on said auxiliary rod and a mechanism for changing a position of said contact portion by a contact position adjusting piston, said mechanism for changing said mounting position of said stopper has a plurality of stepped portions formed on opposite sides of an inner hole of said stopper and having different depths and a stepped portion formed on an outer periphery of said auxiliary rod and is formed to be able to change said mounting position

of said stopper on said auxiliary rod by changing an orientation of said stopper to selectively bring any of said stepped portions into contact with said stepped portion of said auxiliary rod, said mechanism for changing said position of said contact portion has said contact position adjusting piston having said contact portion and said adjusting piston is mounted to said head cover and driven by fluid pressure in such directions as to approach and move away from said stopper, and

10                   said return position setting mechanism includes a return position setting piston provided for sliding to said head cover and a position setting rod connected to said return position setting piston and having a tip end projecting behind said stop position setting piston.

15                   10. A cylinder apparatus according to claim 9, wherein said auxiliary rod passes for sliding through said return position setting piston and said position setting rod and projects outside said head cover and has a flow path connecting a port for supplying pressure fluid and said pressure chamber on one side of said main piston in said auxiliary rod.

20                   11. A cylinder apparatus according to claim 9, wherein said main cylinder has a cushioning mechanism for

reducing a speed of said main piston by restricting a discharge flow rate of fluid discharged from a discharge-side pressure chamber at an end of a stroke of said main piston.

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12. A cylinder apparatus according to claim 9, wherein said main cylinder has a stroke detector for outputting an electric signal according to a stroke position of said main rod and said stroke detector is connected to a detection controller for detecting an operating form of said main rod based on said output.

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13. A cylinder apparatus according to claim 1, further comprising a balance mechanism for causing said stop position setting piston to stop in a position where said stop position setting piston has moved toward said main piston when pressure fluid at the same pressure is supplied to pressure chambers on opposite sides of said stop position setting piston.

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